MULTIFUNCTIONAL NETWORK INTERFACE NODE

CLAIMS

What is claimed:

1. A node for providing a common interface for a plurality of system devices connected to a network, comprising:

(a) user-configurable software for providing a software interface for said plurality of system devices; and

(b) multifunctional hardware for providing a hardware interface for said plurality of system devices.

2. The node of claim 1, further comprising at least one system device connected to said node, wherein said at least one system device is a digital device, an analog device, or a serial device.

3. The node of claim 2, wherein said node provides a switching functionality, whereby the voltage output of said system devices is standardized to a level of about 0 to 5 voltz, about minus 5 to 5 voltz, or about minus 12 to 12 voltz.

4. The node of claim 2, wherein said node provides a switching functionality, whereby the electronic communication formats of said system devices are standardized to a single communication protocol.

5. The node of claim 1, further comprising at least one processing unit connected to said node through said network for processing information received from, and sending information to, said system devices.

6. The node of claim 1, wherein said plurality of system devices consists of digital devices.

7. The node of claim 1, wherein said plurality of system devices consists of analog devices.

8. The node of claim 1, wherein said plurality of system devices consists of serial devices.

9. The node of claim 1, wherein said plurality of system devices consists of digital devices, analog devices, serial devices, or combinations thereof.

10. The node of claim 1, wherein said network is a Controller Area Network.

11. The node of claim 1, wherein said network is any network compatible with said node and said system devices.

12. The node of claim 1, wherein said user-configurable software is expandable and updatable across said network.

13. The node of claim 1, wherein said user-configurable software further comprises:

(a) an application manager layer for facilitating multiprocessing, resource allocation, memory management and cooperation among independent application modules;

(b) application modules layer for application-dependent processing of system inputs and outputs; and

(c) a hardware abstraction layer to consolidate all hardware interfaces accessible from application modules.

14. The node of claim 1, wherein said multifunctional hardware further comprises:

(a) memory for storing said user-configurable software;

(b) a microprocessing subunit for controlling the operation of said hardware as commanded by said user-configurable software;

(c) a plurality of inputs / outputs in communication with said microprocessing subunit for connecting to said system devices, and

(d) a power supply.

15. The node of claim 14, wherein said memory further comprises a volatile memory module and a non-volatile memory module.

16. The node of claim 14, wherein said microprocessing subunit further comprises a microprocessor chip.

17. The node of claim 14, wherein said microprocessing subunit further comprises an address and data bus interface in communication with said memory.

18. The node of claim 14, wherein said microprocessing subunit further comprises an asynchronous serial port in communication with a serial device transceiver in communication with a high-speed serial interface connector.

19. The node of claim 14, wherein said microprocessing subunit further comprises a synchronous serial port in communication with a synchronous serial port interface connector.

20. The node of claim 14, wherein said microprocessing subunit further comprises a background debugging monitor in communication with a background debugging monitor interface connector.

21. The node of claim 14, wherein said microprocessing subunit further comprises a network interface in communication with a network connector.

22. The node of claim 14, wherein said microprocessing subunit further comprises an analog to digital converter in communication with an analog to digital and digital I/O interface connector.

23. The node of claim 14, wherein said microprocessing subunit further comprises a time processing unit in communication with a switch array in communication with a digital I/O and serial interface connector.

24. The node of claim 14, wherein said plurality of inputs/outputs further comprises a plurality of digital input/outputs.

25. The node of claim 14, wherein said plurality of inputs/outputs further comprises a plurality of analog input/outputs.

26. The node of claim 14, wherein said plurality of inputs/outputs further comprises a plurality of serial input/outputs.

27. The node of claim 14, wherein said plurality of inputs/outputs consists of a plurality of digital input/outputs, analog input/outputs, serial input/outputs, or combinations thereof.

28. The node of claim 14, wherein said power supply operates within a range of about 8 to 32V DC.

29. The node of claim 14, wherein said power supply draws its power from either an external power source or the power supply to said network, and automatically chooses said external power supply when both sources of power are available.

30. The node of claim 1, wherein all components of said node are ruggedized to prevent damage resulting from use of said node in high shock or high vibration environments.

31. The node of claim 1, wherein said node operates within a temperature range of about minus 40^0C to 85^0C.

32. The node of claim 1, wherein said node is installed in landcraft, aircraft, or watercraft.

33. A node for providing a common interface for a plurality of system devices connected to a network, comprising:

(a) user-configurable software for providing a software interface for said plurality of system devices wherein said user-configurable software further comprises:

(1) an application manager layer for facilitating multiprocessing, resource allocation, memory management and cooperation among independent application modules;

(2) application modules layer for application-dependent processing of system inputs and outputs; and

(3) a hardware abstraction layer to consolidate all hardware interfaces accessible from application modules; and

(b) multifunctional hardware for providing a hardware interface for said plurality of system devices, wherein said multifunctional hardware further comprises:

(1) memory for storing said user-configurable software;

(2) a microprocessing subunit for controlling the operation of said hardware as commanded by said user-configurable software;

(3) a plurality of inputs / outputs in communication with said microprocessing subunit for connecting to said system devices; and

(4) a power supply.

34. The node of claim 33, further comprising at least one system device connected to said node, wherein said at least one system device is a digital device, an analog device, or a serial device.

35. The node of claim 33, wherein said node provides a switching functionality, whereby the voltage output of said system devices is standardized to a level of about 0 to 5 voltz, about minus 5 to 5 voltz, or about minus 12 to 12 voltz.

36. The node of claim 33, wherein said node provides a switching functionality, whereby the electronic communication formats of said system devices are standardized to a single communication protocol.

37. The node of claim 33, further comprising at least one processing unit connected to said node through said network for processing information received from, and sending information to, said system devices.

38. The node of claim 33, wherein said plurality of system devices consists of digital devices.

39. The node of claim 33, wherein said plurality of system devices consists of analog devices.

40. The node of claim 33, wherein said plurality of system devices consists of serial devices.

41. The node of claim 33, wherein said plurality of system devices consists of digital devices, analog devices, serial devices, or combinations thereof.

42. The node of claim 33, wherein said network is a Controller Area Network.

43. The node of claim 33, wherein said network is any network compatible with said node and said system devices.

44. The node of claim 33, wherein said user-configurable software is expandable and updatable across said network.

45. The node of claim 33, wherein said memory further comprises a volatile memory module and a non-volatile memory module.

46. The node of claim 33, wherein said microprocessing subunit further comprises a microprocessor chip.

47. The node of claim 33, wherein said microprocessing subunit further comprises an address and data bus interface in communication with said memory.

48. The node of claim 33, wherein said microprocessing subunit further comprises an asynchronous serial port in communication with a serial device transceiver in communication with a high-speed serial interface connector.

49. The node of claim 33, wherein said microprocessing subunit further comprises a synchronous serial port in communication with a synchronous serial port interface connector.

50. The node of claim 33, wherein said microprocessing subunit further comprises a background debugging monitor in communication with a background debugging monitor interface connector.

51. The node of claim 33, wherein said microprocessing subunit further comprises a network interface in communication with a network connector.

52. The node of claim 33, wherein said microprocessing subunit further comprises an analog to digital converter in communication with an analog to digital and digital I/O interface connector.

53. The node of claim 33, wherein said microprocessing subunit further comprises a time processing unit in communication with a switch array in communication with a digital I/O and RS-232 interface connector.

54. The node of claim 33, wherein said plurality of inputs/outputs further comprises a plurality of digital input/outputs.

55. The node of claim 33, wherein said plurality of inputs/outputs further comprises a plurality of analog input/outputs.

56. The node of claim 33, wherein said plurality of inputs/outputs further comprises a plurality of serial input/outputs.

57. The node of claim 33, wherein said plurality of inputs/outputs consists of a plurality of digital input/outputs, analog input/outputs, serial input/outputs, or combinations thereof.

58. The node of claim 33, wherein said power supply operates within a range of about 8 to 32V DC.

59. The node of claim 33, wherein said power supply draws its power from either an external power source or the power supply to said network, and automatically chooses said external power supply when both sources of power are available.

60. The node of claim 33, wherein all components of said node are ruggedized to prevent damage resulting from use of said node in high shock or high vibration environments.

61. The node of claim 33, wherein said node operates within a temperature range of about minus 40^0C to 85^0C.

62. The node of claim 33, wherein said node is installed in landcraft, aircraft, or watercraft.

63. A system for automated control of a plurality of system devices, comprising:

(a) a node for providing a common interface for said plurality of system devices, further comprising: user-configurable software for providing a software interface for said plurality of system devices; and multifunctional hardware for providing a hardware interface for said plurality of system devices;

(b) a plurality of digital, analog, serial, or other system devices in communication with said node by means of a network; and

(c) a processing unit in communication with said node by means of said network for communicating with and controlling said system devices.

64. A method for communicating with a variety of system devices from at least one processing terminal, comprising:

(a) connecting said system devices to a multifunctional network interface node further comprising a user-configurable software interface; and a hardware interface, whereby said node standardizes the voltage output levels and electronic communications protocols of said system devices; and

(b) connecting said multifunctional network interface node to a processing unit by means of a network, whereby said information from said system devices may be received and processed, and commands may be sent to said system devices.